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SUMMARY REPORT OF QUESTIONNAIRES DISTRIBUTED TO THE ONTARIO MAPLE SYRUP PRODUCERS ASSOCIATION - FALL, 1985

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Summary Report of Questionnaires Distributed to the Ontario Maple Syrup Producers Association - Fall 1985

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Ontario Maple Syrup Producers Association - Fall, 1985

Background

In 1984 and 1985 the Ministry of the Environment conducted a study into the decline of sugar maple trees at 8 sites in Muskoka/Haliburton and 2 locations in Peterborough. Investigators were continuously asked 1) was it worse in Muskoka or Peterborough than elsewhere in Ontario, and 2) historically speaking, are the trees in better or poorer condition. It became apparent that regional and historical data on the condition of Ontario's hardwood forests was lacking. Although an annual forest pest and disease survey is conducted by the Canadian Forestry Service this does not provide a broad enough or consistent enough data base on which to judge regional forest conditions.

In 1985 the MOE initiated two additional projects in an attempt to provide regional background data on forest conditions in Ontario. One was a two-year contract awarded to the environmental consulting company Ecological Services for Planning Ltd. (ESP) to establish a network of permanent observation plots across the hardwood forest region of the province and to evaluate the condition and growth of trees in these plots. This survey will be periodically repeated at the same locations to determine changes in tree condition with time.

The second project was aimed specifically at the maple syrup industry in the province. With the co-operation and assistance of OMAF a survey questionnaire was designed and distributed to 610 members of the Ontario Maple Syrup Producers Association (OMSPA). The survey consisted of two parts. The first section dealt with technical aspects of the maple syrup industry and the second part was concerned with the condition of the trees in the sugar bush, specifically the status of forest decline. It was intended to provide an immediate data base on the condition of Ontario's syrup producing hardwood stands. Also, with a good geographical distribution of survey returns, it may be possible to locate areas where woodlot owners feel tree decline is evident. These areas could be cited for additional permanent observation plots as part of the ESP contract.

This report summarizes the results of the joint MOE/OMAF Maple Syrup Producers Association survey.

The MOE/OMAF Survey

A total of 610 questionnaires were mailed in September 1985 to producing members of the Ontario Maple Syrup Producers Association. By December, 50.5% (308) of the surveys had been returned to the MOE Phytotoxicology laboratory in Toronto. The data were entered into the MOE mainframe computer and processed with a program entitled Statistics for Social Planning. This program provided descriptive statistics, distributions and search and cross-reference capabilities.

The following is a question by question summary of the survey results. In some cases the total may not equal precisely 100%. This is because of rounding off to the nearest whole number and some of the surveys returned indicated more than one choice for some of the questions.

Question 1.1: **Where is your woodlot?**

Although both county and township were requested on the survey, to save space on the computer files only the county was tallied. Survey returns came from 39 counties across Ontario. Geographically, maple syrup producers are located throughout the hardwood forest region. Lanark county led the way with 24 survey returns. It was followed by Waterloo (23), Parry Sound (22), Renfrew (18) and Simcoe (17). No surveys were received from Brant, Niagara or Metropolitian Toronto. Table 1 lists the counties and their corresponding number of returns.

Question 1.2: **Do you own or rent your woodlot?**

Most of the OMSPA members owned their own woodlot (92%), although a few (8%) rented the land on which they tapped trees. Also about 5% responded that they owned some land but rented additional land.

Question 1.3: **How large is your woodlot?**

The average sugar bush was 62 acres in size. The woodlot size tended to be larger in the northern locations and smaller in the southern communities. Only 6% of the producers have woodlots over 200 acres, whereas just over 30% of the sugar bushes are less than 20 acres in size.

Woodlot Size (Acres)	% Survey Returns
less than 20	31%
20 - 49	31%
50 - 99	19%
100 - 200	13%
greater than 200	6%

Question 1.4: **How long have you been producing maple syrup products?**

The average length of time was 18 years. Slightly more than 7% of the producers have been making maple syrup for more than 50 years.

Length of Time (Years)	% Survey Returns
less than 5	18%
5 - 9	23%
10 - 19	26%
20 - 50	26%
greater than 50	8%

Question 1.5: **To your knowledge was the woodlot tapped before you started your operation, and if it was, about how long before?**

Sixty-eight per cent of the respondents said yes, their bush was tapped before they had started. The remaining 32% said they were the first operators in their bush.

Length of Time Bush Tapped by Previous Owner (Years)	% Survey Returns
less than 20	17%
20 - 49	37%
50 - 100	33%
greater than 100	13%

The average length of time that a bush had been tapped by a previous owner was 48 years. Combined with Question 1.4, the average length of time a multiple owner bush has been tapped was 66 years.

Question 1.6: **Please indicate your primary occupation**

Occupation	% Survey Returns
farmer	48%
tradesman (plumber, welder etc.)	15%
professional (doctor, lawyer etc.)	15%
retired	14%
factory worker	2%
retail worker	2%
office worker	2%
woods worker	2%

Almost one half of the respondents were farmers, who likely use the proceeds from their maple syrup business to supplement their farm income. About 1/3 of the OMSPA members are tradesmen or professionally employed and the next largest occupation-group are people who are retired from the full-time work force.

Question 1.7: **Do you consult OMAF regarding the management of your woodlot or the production of syrup products?**

Only 10% of the respondents regularly consult with OMAF and 45% do so occasionally. The remaining 45% claimed they never consult OMAF extension services.

Question 1.8: **Do you consult MNR regarding the management of your woodlot or the production of syrup products?**

MNR faired slightly better than OMAF regarding the utilization of consulting services; 17% do so regularly, 48% occasionally and 35% never. It is assumed that most of the requests for consulting services are for woodlot management which has traditionally been regarded as an MNR responsibility. Also, most syrup producers turn towards their fellow members within the Maple Syrup Producers Association for information and advice on production techniques.

Question 2.1: **What is the approximate sugar maple content of your sugar bush?**

Proportion Sugar Maple	% Survey Returns
less than 1/3	19%
1/3 - 2/3	40%
greater than 2/3	41%

The larger the maple syrup operation, the greater the percentage of sugar maple trees in the woodlot, as these producers were more aggressive in crop tree selection.

Question 2.2: **Please indicate other tree species present in your woodlot?**

Because of the many possible species combination this response required too much data storage space and so this question was removed from the analysis mode of the program.

Question 2.3: **Has your woodlot been grazed in the last 20 years?**

Despite the obvious and well known adverse relationship between woodlot managment and cattle grazing, 32% of the respondents replied yes to this question.

Question 2.4: **Have you conducted a thinning cut in the last 20 years?**

Seventy-five per cent said they had conducted a thinning harvest in their woodlot in this time period.

Question 2.4.1 **If yes (to Question 2.4) who marked the trees to be removed?**

Seventy-four per cent of the respondents marked the trees themselves, 25% asked the MNR to do the tree selection, and 0.4% hired a private jobber.

Question 2.5: **Is it your practice to annually remove trees which appear in poor health or have recently died?**

A large majority (92%) of OMSPA members remove unthrifty or dead trees annually. This practice has the dual advantage of removing potential infection courts for a variety of secondary insect and disease organisms and creating a canopy opening into which adjacent potential crop trees can expand. In addition, much needed fuel wood is provided. However, recently some producers who have experienced tree decline in their bushes have observed that immediate removal of declining trees sometimes results in the subsequent decline of adjacent trees. This may be related to the sensitivity of mature sugar maple to a sudden increase in light levels. Leaves and terminal twigs which evolved in the shade of a closed canopy are not tolerant of full sunlight, and when an adjacent tree is

removed terminal twig dieback may occur. Sugar maple's intolerance of direct sunlight is the main reason woodlot thinning should not exceed 25% of the basal area. If fuel wood needs are not critical it is suggested that declining trees be left to stand until the crown is almost naked, thereby giving the surrounding trees the opportunity to gradually adjust to stronger sunlight.

Question 2.6: **What is the age distribution of the sugar maple in your woodlot?**

Age Distribtuion	% Survey Returns
mostly younger trees	17%
mostly mature trees	19%
mostly over-mature trees	6%
all ages	58%

Question 3.1: **How many taps did you run in 1985?**

The average number of taps in 1985 was 1,064, but more than one in five OMSPA members had more than 1,500 taps. The number of taps ranged from 10 to 6000.

Number of Taps	% Survey Returns
less than 500	37%
500 - 999	23%
1000 - 1499	17%
1500 - 2000	8%
greater than 2000	15%

Question 3.2: **How many litres of syrup did you produce in 1985?**

Although the average number of litres of syrup produced in 1985 was 829, most OMSPA members made less than 500 litres of maple syrup. The range was very large, from 1 litre to over 4000 litres.

Number of litres syrup	% Survey Returns
less than 500	52%
500 - 999	22%
1000 - 1499	11%
1500 - 2000	3%
greater than 2000	12%

Question 3.3: **What was your 1985 farm retail price?**

The price per 1 litre and 4 litre can was very consistent. The 1 litre average price was $8.20. Only a few members sold for more than $9.10 or less than $7.30. The average retail price of a 4 litre can was $25.60. It sold as high as $28.00 and as low as $23.00.

Question 3.4: **Approximately what percentage of your product sales were wholesale/retail/bulk?**

Most surveys indicated a little of each.

% of Product Sales	% Survey Returns		
	Wholesale	Retail	Bulk
less than 25%	81%	24%	91%
25 - 49%	6%	4%	6%
50 - 75%	6%	13%	3%
greater than 75%	6%	59%	0.3%

At first glance this is a confusing table. However, follow these examples and its meaning becomes clear. Go to the bottom category of the % sales column (greater than 75%). Read to the right along the same line under % Survey Returns. The table tells us that 6% of O.M.S.P.A. members wholesaled more than 75% of the maple syrup they produced, 59% retailed that percentage of their product and only 0.3% of the producers bulk sold the majority of their syrup. Overall, 56% of the producers regularly wholesaled syrup, usually to local retail outlets, whereas less than 39% normally wholesaled their entire annual production. This compares with 61% who retail all their syrup. Only 5% of the survey returns said they would regularly engage in all three marketing avenues.

Question 3.5: **What is your method of sap collection?**

Many respondents indicated they used a variety of sap collection methods. For instance, buckets were common on small operations and for trees close to the sugar shack in larger bushes. Most producers using tubing employed both vacuum and gravity systems. The percentage of producers using only buckets was 40%, whereas 41% used only tubing. The remaining 19% used both buckets and tubing.

Method of Sap Collection	% Survey Returns
buckets only	40%
buckets plus tubing (gravity)	14%
buckets plus tubing (vacuum)	4%
buckets plus tubing (gravity + vacuum)	2%
tubing (gravity)	16%
tubing (vacuum)	23%
tubing (gravity + vacuum)	2%

Question 3.6: **What fuel do you use in your evaporation?**

Like the method of sap collection, many producers used more than one type of fuel, although wood was by far the most popular.

Fuel	% Survey Returns
Wood	79%
wood + propane	8%
oil	6%
wood + oil	4%
electricity	1%
wood + electricity	1%
propane	0.6%
natural gas	0.3%
oil + propane	0.3%

Question 3.7: **Do you use a reverse osmosis machine?**

Yes - 8% No - 92%

Question 3.8: **Do you use a snap preheater?**

Yes - 33% No - 67%

Question 3.9: **Do you use a forced draft wood system?**

Yes - 0.6% No - 99%

Question 3.10: **Do you use a Raithby Economizer?**

Yes - 0.6% No - 99%

Quesiton 3.11: **What filtration do you use?**

It was more common to use more than one filtration method, but on average the numbers were as follows:

cone filter - 58% flat filter - 40% pressure filter 3%

Question 3.12: **What do you use to measure the finished density?**

Again it was more common to use more than one method to determine maple syrup density. A simple survey frequency distribution follows:

Density Measurement	% Survey Returns
thermometer	59%
refractometer	47%
hydrometer	26%
dipper	16%
hydrotherm	9%

Question 3.13: **Do you make candy from your maple syrup?**

One in three OMSPA members make maple candy.

Yes - 30% No - 70%

Question 3.14: **How would you rate the income earned from your maple syrup operation relative to your total income?**

Income Earned	% Survey Returns
insignificant component of total income	32%
minor component of total income	48%
substantial component of total income	18%
the major component of total income	3%

Even though the majority of OMSPA members (80%) indicated their maple syrup income contributed only marginally to their total income, one in five (20%) stated that their maple syrup business provided a substantial return to their family finances. Clearly maple syrup production is not just a hobby industry.

Question 4.1: **What is the approximate annual tree mortality in your woodlot?**

Although 1 to 2% annual mortality is natural, up to 3% can frequently occur. Almost 3/4 of the respondents (72%) said annual tree mortality does not exceed 3%. Conversely 27% of the OMSPA survey returns claim annual woodlot mortality ranges from 4-10%. Only 2% of the syrup producers claimed tree mortality ranged from 11%-50% per year and no one indicated greater than 50% annual mortality.

Question 4.2: This question listed symptoms commonly associated with maple decline and asked if these symptoms had been observed in the last ten years (with no apparent cause).

Because of the number of possible combinations of symptoms (there were 12 choices in the survey question), this question was not tabulated by the computer. Rather it was simply broken down into those reporting symptoms (70%) and those not reporting symptoms (30%). In the last 10 years almost 7 out of 10 OMSPA members have observed maple decline symptoms in their woodlot.

Question 4.3: **Do you feel that hardwood decline is a problem in your sugar bush now?**

One out of three (33%) survey returns felt hardwood tree decline was a current problem. Conversely, 67% had no current concern with this issue.

Question 4.3.1: **If yes (to Question 4.3) in what year did you first become aware of a decline problem?**

Year Decline First Noticed	% Survey Returns
before 1960	1%
1960 - 1969	2%
1970 - 1979	25%
after 1980	73%

The earliest decline observation was 1955. The most frequently cited year was 1982 (20% of respondents) followed by 1980 (17%). Clearly however, OMSPA members felt that decline in their woodlots was a recent phenomenon.

Question 4.3.2: **Does the decline appear to be getting worse or getting better?**

Decline Status	% Survey Returns
getting worse	72%
getting better	17%
about same (no change)	12%

More than 7 out of 10 producers who presently have a decline problem felt that the condition of their woodlots is continuing to deteriorate.

Question 4.4: **To your knowledge, has a decline episode occurred in your woodlot in the past?**

Only 11% of the survey returns indicated they were aware of a past decline episode and 89% said they have never experienced a previous period of tree decline.

Question 4.4.1: **If yes (to Question 4.4) about what year(s)?**

This question was inserted to double check those who responded positively to Question 4.3 and 4.3.1.

Year Previous Decline Observed	% Survey Returns
1955	1%
1960	1%
1970	5%
1972	1%
1975	4%
1977	2%
1978	4%
1979	8%
1980	17%
1981	8%
1982	20%
1983	14%
1984	10%
1985	4%

Although the majority of maple syrup producers cite the last 5 years most frequently 25% claim decline was occurring/occurred in their woodlots in the 1970's well before forest dieback became a topical issue.

Question 4.5: **To your knowledge has the following caused significant damage to your woodlot? Please specify the approximate year(s)?**

Again the number of potential combinations caused memory/storage problems with the computer; therefore, the year was omitted from the data file.

Damaging Natural Phenomena	% Survey Returns
wind storms	26%
ice storms	18%
insect defoliation	17%
summer drought	6%
low snowfall winter	3%
very cold winter	3%
have not experienced these problems	27%

Question 4.6: **Please specify on which tree species decline symptoms in your woodlot are most often observed?**

Tree Species	% Survey Returns
maple	41%
ash	9%
beech	6%
birch	4%
oak	3%
other species	12%
all species	25%

It is not significant that maple was most often cited as experiencing decline symptoms, as virtually all of the woodlots were managed for maple syrup and maple was the dominant species (Question 2.1 stated 41% of the survey woodlots were composed of greater than 2/3 sugar maple). It is significant that one in four respondents stated that decline symptoms have been seen on all tree species in their woodlots.

Question 4.7: **On what diameter class are decline symptoms most often observed?**

Diameter Class	%SurveyReturns
less than 10 cm	8%
10 - 20 cm	17%
21 - 30 cm	10%
31 - 40 cm	4%
greater than 40 cm	1%
decline not a problem	32%
all diameter classes	23%

In addition, 2% of the returns indicated both less than 10 and 10 - 20 categories and the remaining 3% checked both 10 - 20 and 21 - 30 categories. Although there was no single size category which the producers observed to be most seriously affected, 35% of the survey returns stated decline symptoms were most often observed on smaller diameter trees and 23% stated all diameter classes.

Question 4.8: **In what area of your woodlot are the decline symptoms most often observed?**

Site Type	% Survey Returns
bottom lands	11%
hilltops	8%
slopes	7%
slopes and hilltops	2%
bottom and slopes	0.5%
bottom and hilltops	0.5%
all over	35%
decline not a problem	36%

When decline symptoms were observed, 35% of the producers replied it occurred on all site types. Ontario, generally, does not have the topographical relief common in Quebec or the northeastern United States, where maple decline has also been reported. In these latter areas decline is often observed on specific sites or aspects. In Ontario, where maple decline does occur, it is not site specific.

Question 4.9: **In your opinion regeneration in your woodlot is:**

Regeneration	% Survey Returns
very good	28%
good	34%
adequate	26%
less than adequate	9%
very poor	3%

In total, 88% of OMSPA members felt regeneration was adequate or better.

Question 4.10: **In the last 5 years has the sap volume from your woodlot changed significantly?**

Sap Volume	% Survey Returns
increased	9%
decreased	13%
not changed	56%
don't know	22%

78% of the respondents replied either that they do not know or that the sap volume has not changed. Slightly more claimed the sap volume has decreased than those producers who felt the volume has increased.

Question 4.11: **In the last 5 years has the sap sweetness from your woodlot changed?**

Sap Sweetness	% Survey Returns
increased	4%
decreased	10%
not changed	53%
don't know	33%

The ratio of response to this question was similar to Question 4.10. Slightly more producers felt that the sap sweetness had decreased rather than increased but the majority (86%) either did not know or claimed it had not changed.

Question 4.12: **In the last 5 years has your syrup production per tap changed?**

Production per Tap	% Survey Returns
increased	13%
decreased	16%
not changed	53%
don't know	18%

Question 4.13: **In the last ten years have you experienced an unexplained syrup "off-flavour"? If yes, in what year(s)?**

Only 1 in 10 (10%) of OMSPA members replied that they had experienced a flavour problem for which they could not attribute a cause. There were some responses for each year of the last decade. There was no apparent relationship with location, size of sugar operation or method of sap collection.

Year Off-Flavour Occurred	% Survey Returns
1985	5%
1984	12%
1983	19%
1982	6%
1981	15%
1980	7%
1979	8%
1978	9%
1977	9%
1976	10%

A Measure of Productivity

The fewer taps required to produce a litre of maple syrup the more efficient and profitable the operation. A measure of efficiency/productivity can be estimated by the ratio of taps to litres of syrup produced (Question 3.2 divided by Question 3.1). The average litre/tap ratio for all survey returns was 0.82, however, there was a tremendous variation ranging from a low of 0.16 to a high of 2.55. The following table illustrates the distribution of the production ratio.

Litre/Tap Ratio	% Survey Returns
0.2	5%
0.4	12%
0.6	17%
0.8	19%
1.0	25%
1.2	11%
1.4	7%
1.6	2%
1.8	1%
2.0	1%
2.5	0.5%

More producers tended to be on the lower end of the distribution scale. In fact, 78% of the returns had a calculated production ratio of 1.0 or less. At the 0.2 level a producer would have to operate 5 taps to make 1 litre of maple syrup and at the other end of the scale (2.5) each tap yields 2.5 litres of syrup.

A producer with a 0.16 production ratio commented "I don't know what's happened, but syrup production has hit the skids". Conversely, the 2.55 ratio producer euphorically replied "the bush has been quite productive, to our delight".

Although few correlation statistics were performed on the production ratio data, the highest ratios (most efficient and therefore most profitable) tended to be both the largest and the smallest operations.

Correlation statistics

The computer program could cross reference the data from most of the questions in the survey. However many of these cross correlations are nonsence relationships. For instance, Question 1.2 (woodlot ownershop) and Question 3.4 (method of syrup sales) yields no practical data. The cross-referencing was conducted primarily on the questions dealing with woodlot decline, although woodlot management and production/efficiency parameters were also examined.

Factors Relating to Woodlot decline: Decline vs Location (4.3 vs 1.1)

The surveys answering "yes" to Question 4.3 (Is hardwood decline currently a problem in your sugar bush?) were cross-referenced with all other practically related questions in the survey. The attached table lists the survey

returns by county, and also lists the positive replies to Question 4.3. Elgin, Prescott & Russell, Kent, and Essex were counties where 75% of the maple syrup producers reported a current decline problem. However, these data are questionable because of the low number of surveys returned from these areas. Counties where between 50% and 75% of OMSPA members reported a current decline problem included, Middlesex, Perth, Nippising, Durham, Renfrew, Parry Sound, Sudbury and Hamilton/Wentworth. These data confirm what MNR and MOE field personnel have observed, that maple decline in Ontario is a scattered, isolated phenomenon which occurs on all soil and site types. Hardwood decline distribution by county is illustrated in the attached map entitled "Number of Survey Returns Reporting Hardwood Decline".

Decline vs Woodlot Size (4.3 vs 1.3)

There was a marked tendency towards decline occurring in smaller woodlots (40% "yes" response for woodlots less than 26 acres). This may be related to producers being more familiar with small woodlots or a more noticeable "edge effect" with small areas.

Decline vs Tapping History (4.3 vs 1.5)

Almost twice as many declining woodlots were tapped before the previous owner. Historically tapped woodlots had a much higher frequency of decline (66% historically tapped now in decline, 34% not previously tapped now in decline).

Decline vs MNR Consultation (4.3 vs 1.8)

There was no relationship between the frequency of tree decline and MNR consultation for woodlot management.

Decline vs Cattle Grazing (4.3 vs 2.3)

For the woodlots currently in decline, 25% had been grazed by cattle in the last 20 years and 75% had not been grazed. Therefore historical woodlot grazing does not appear to be related to current tree decline.

Decline vs Thinning (4.3 vs 2.4)

Seventy-nine per cent of the woodlots which had been thinned in the last 20 years are currently in decline. Conversely, 21% of the declining woodlots had not experienced a thinning harvest. This is a clear indication that basal area reduction in sugar maple stands should be kept at the minimum necessary to achieve release of crop trees.

Decline vs Tapping Method (4.3 vs 3.5)

Although there was a greater frequency of decline in woodlots under vacuum tubing the difference was only a few percentage points higher than bucket collection, and so the relationship is likely insignificant.

Decline vs Symptoms (4.3 vs 4.2)

This cross reference was an internal check. Since only those surveys which replied "yes" (decline present) to Question 4.3 were used in this part of the data comparison there should be an absolute correlation with Question 4.2 asking if tree decline symptoms were present. There was 99% agreement. Only one survey which replied positive to 4.3 did not indicate symptoms for 4.2. In fact this question, and several others in that survey, were left blank.

Decline vs Past Decline (4.3 vs 4.4)

Hardwood decline, for the majority of OMSPA members, is a new phenomenon. Eighty-seven per cent of those with a current tree decline problem have not observed a decline episode in their woodlot in the past.

Other Decline Relationships

There was no apparent relationship between current tree decline and regeneration (4.9), sap volume (4.10), sap sweetness (4.11), and the occurrence of unexplained syrup "off-flavour" (4.13). There was a tendency towards decreased syrup production per tap, (ie 28% noticed decreased production with decline vs 16% for all survey returns). There was also a tendency towards a slightly lower productivity ratio in woodlots reporting a current decline; 0.807 declining woodlot vs 0.854 healthy woodlot. However, their were many exceptions to these averages and the difference between the mean productivity ratio for declining and healthy woodlots was not statistically significant.

Regeneration Comparisons

Regeneration success was not related to thinning practices, woodlot age, species groups or annual tree mortality. However, there was a tendency towards producers reporting good or very good regeneration who also regularly or occasionally consult the MNR. Also 28% of the respondents who grazed their woodlot complained of less than adequate or very poor regeneration whereas only 7% who had not grazed were similarly concerned about regeneration.

Production Comparisons

The data comparisons for sap volume, sap sweetness and production per tap were weak because of the large number of survey returns marked "not changed" and "don't know". However 13% of the surveys reporting an increase in syrup produced per tap were using buckets compared to only 3% using gravity tube and 8% on vacuum tube. Conversely 19% reporting a decrease in production per tap were using vacuum tube, 13% with gravity tube and 9% on buckets.

The only other production technique which appeared to be a factor in operation efficiency or profitability was the use of reverse osmosis. Of the 8% of OMSPA members using this process 29% reported an increase in syrup production per tap whereas only 11% of producers not using reverse osmosis reported a similar increase. Conversely only 8% of the reverse osmosis users reported decreased syrup production per tap whereas 17% of the non reverse osmosis users claimed a decreased production ratio. The average productivity ratio for all survey returns was 0.82 (i.e, 0.82 l syrup produced per tap). For those producers using reverse osmosis the productivity ratio was 0.98, a production increase of 26% compared to non reverse osmosis operations.

The average productivity ratio for each county is listed in the attached table. Counties with a productivity ratio greater than 1.00 were Lambton, Waterloo, Dufferin and Lennox/Addington. The Southern counties tended to be more productive, but again there were exceptions to this rule. The productivity distribution is illustrated in the figure entitled "Productivity Ratio by County."

Additional Observations

The last page of the survey was blank. This was to provide an opportunity for the respondents to add data which they felt may be informative or simply interesting. This section of the report summarizes some of the comments written on the blank page at the end of the survey.

Additional comments were provided by 41.6% of the respondents. Most producers added a few lines to emphasize a particular problem or solution which they had encountered or gave further details to one or more of the survey questions. There were four very common themes expressed by the majority of OMSPA members. First, they were pleased to see this type of survey and desired that the results be made available. This report will be mailed to all 610 maple syrup producers who originally received the survey. Also, copies will be

distributed to the OMSPA regional chapters and, as a public report, it will be kept on file at selected OMAF, MNR and MOE district offices. Additional copies can be obtained by contacting either John Butler (OMAF, 705-322-2231) or Dave McLaughlin (MOE, 416-965-4516).

Second, most respondents expressed concern not only about acid rain but general environmental degradation. Many volunteered their services or their woodlots to assist with future studies.

The third general theme, particularly from central and eastern Ontario, was the grave concern regarding the spread and potential damage associated with gypsy moth infestations. Many producers from the Kaladar, Belleville and Kingston area felt that this moth is the greatest single threat our hardwood forests have ever encountered.

Fourth, almost all of the survey returns that commented on gypsy moth also stated they were in favour of aerial spraying as a control mechanism. Although most said chemicals should be used if necessary, the bacterial control spray BT was the preferred choice.

The following comments were chosen because of their informative or interesting nature:

1. Black maple was identified as an important sugar tree by some producers, particularly in southwestern Ontario. The respondents who were aware of the black maple component in their woodlot stated these trees consistently yielded sweeter sap than sugar maple. One producer said a large black maple on his property consistently has a sap sugar content of 7.5%. The producer with the highest production ratio (2.55 l syrup/tap) was from Dufferin county and commented "we have quite a bit of black maple in our woodlot".
2. The first run of sap made the best syrup, but sap sweetness tended to increase as the season progressed.
3. General dissatisfaction was expressed with paraformaldehyde tablets. The inhibition of tap hole healing was felt to be a greater liability than the asset of a slightly extended season.
4. One producer requested MNR mark his trees for thinning but neglected to inform them that the woodlot was to be used as a sugar bush and not managed for lumber production, therefore, in his woods "all the wrong trees were marked". This illustrates the importance of close cooperation with consulting services to ensure that management objectives are understood.
5. Ken Hunter of Kingsville claims to have the most southerly sugar bush in Ontario.

6. Off-flavoured syrup attracted considerable attention. A producer from Renfrew describes his syrup in 1985 as "tasting like the ground". Several producers equated poor syrup flavour with dark colour and weather phenomena, most often with an early thaw or very mild temperatures early in the year. Mild weather produced milky sap, which produced dark coloured syrup with poor flavour. Another producer who associated dark coloured and poor tasting syrup with early thaws also said his filter residue was sticky rather than the usual sandy texture. It was also suggested that syrup flavour was linked wth collection tube cleanliness. One respondent claimed he washed all his main lines within a week of early season mild weather and rarely experienced colour or flavour problems encountered by his neighbours.

7. Tree decline was a common topic, and although it has been thoroughly discussed earlier in this survey report, a few additional comments were supplied by OMSPA members. Decline in some woodlots appears to be worse after dry summers and cold winters with little snow. Small leaves throughout the crown, but more noticeable at the top, and early fall colouration were often mentioned by producers although tree decline was not apparent. Several producers using both tubing and buckets reported a greater decline frequency for trees on tubing. Declining trees were often observed to recover, therefore, as one producer stated "don't cut the sucker down 'till you're sure it's a goner". Although only a few respondents had experimented with individual tree or woodlot fertilization, periodic application of ammonium nitrate was reported to improve foliar thickness and colour.

Acknowledgments

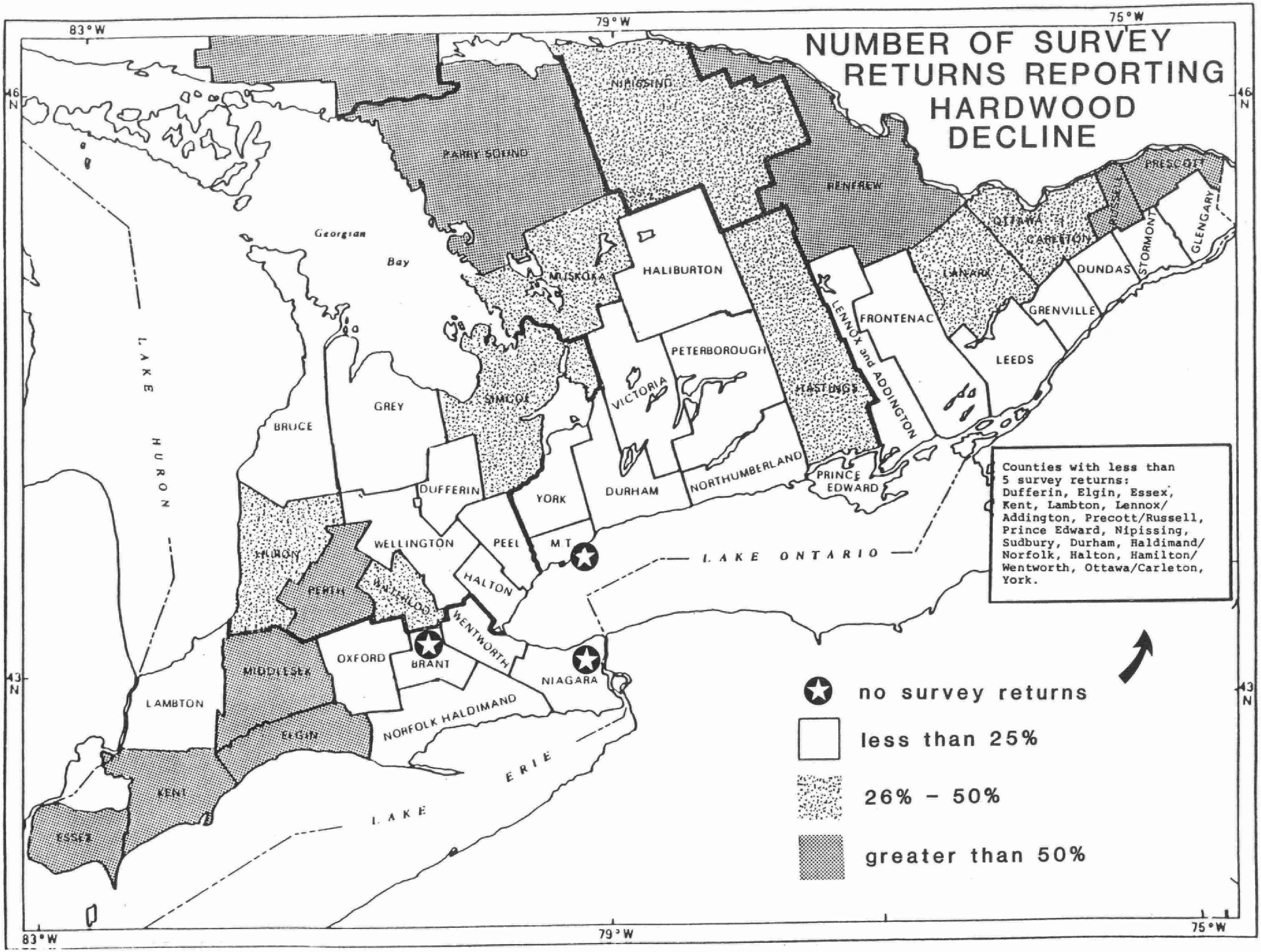
Surveys rarely achieve a 50% return rate, which this one did. Therefore, the members of the Ontario Maple Syrup Producers Association must be congratulated for their cooperative spirit and sincere environmental concern. The complexity and number of returned surveys posed a manpower problem as no special preparations were made to handle the data. The survey had 45 questions and a total of 172 possible responses. Therefore the 308 returned surveys provided 52,976 pieces of data. The number of possible cross-referenced responses ran into the millions. The MOE main frame computer handled the heavy number manipulation but the 52,976 data pieces had to be manually coded and keypunched. The resultant output data then had to be sorted, the nonsense relationships discarded and the remaining information correlated with the overall survey averages to determine which comparisons were significant. These tedious and time consuming tasks were diligently and thoroughly accomplished by Stephen Rutherford. There is no doubt that this report could not have been completed without Stephen's significant contribution. The authors also acknowledge the assistance of Bob Chai, Phytotoxicology biostatistician, for his assistance with the main frame computer.

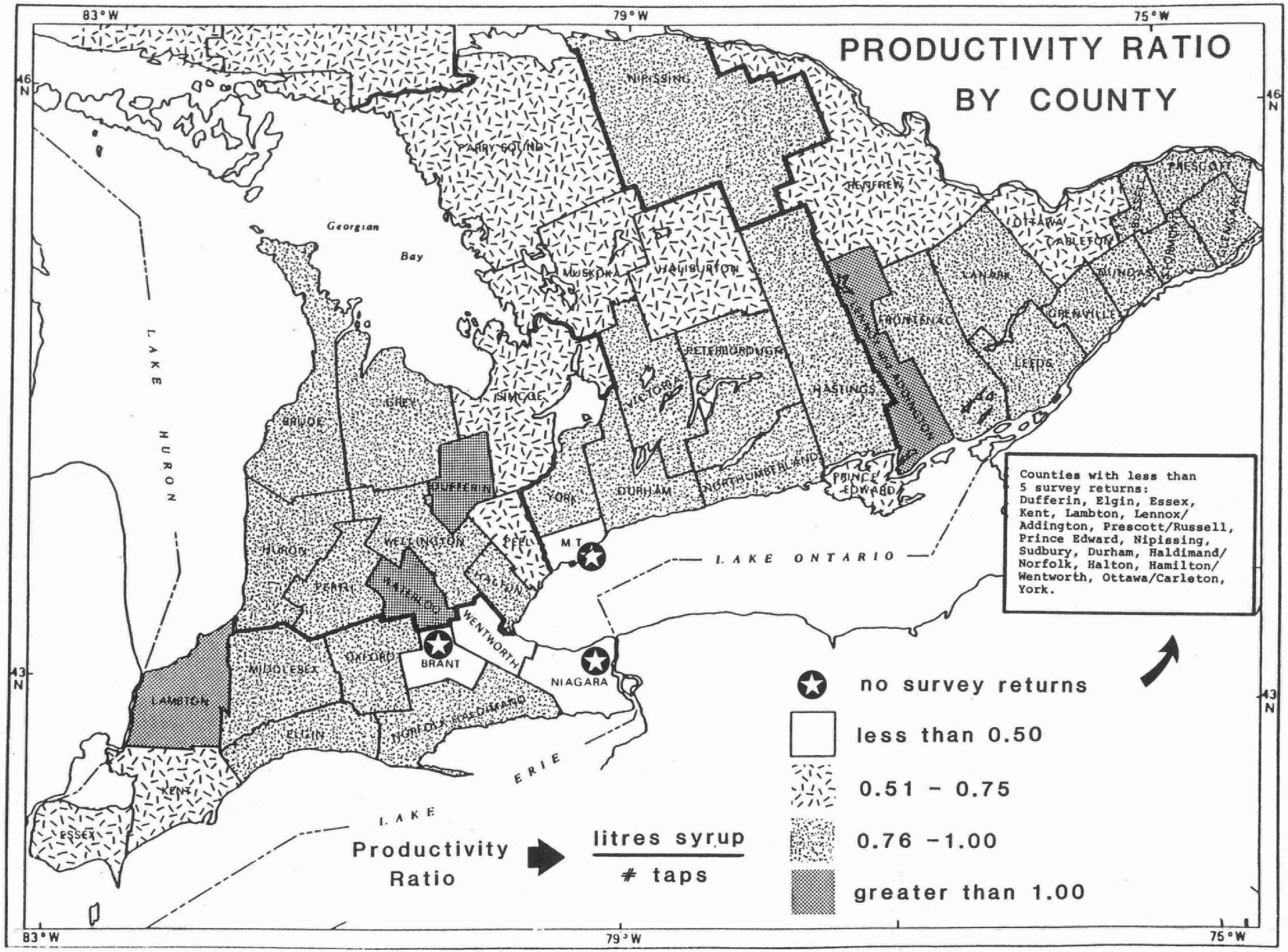
Table 1

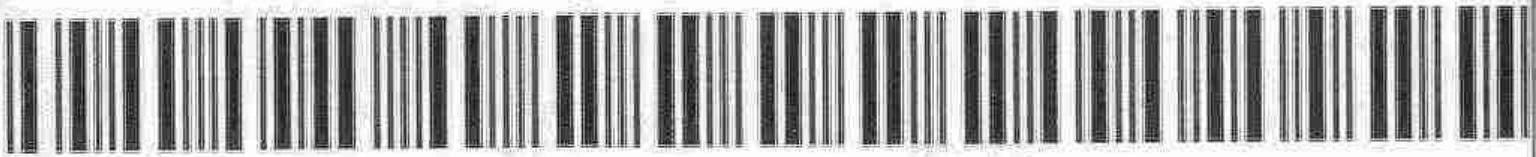
Response Distribution: County of Origin/Yes to Decline/Productivity Ratio

County	Total No. Returned Surveys	No. Yes to decline (Question 4.3)	Productivity Ratio	County	Total No. Returned Surveys	No. Yes to decline (Question 4.3)	Productivity Ratio
Bruce	8	1	0.96	Stormont, Dundas & Glengarry	9	1	0.91
Dufferin	4	0	1.21	Prince Edward	2	0	0.69
Elgin	4	3	0.81	Victoria	6	1	0.94
Essex	1	1	0.51	Wellington	10	2	0.85
Frontenac	7	1	0.97	Algoma	14	2	0.68
Grey	9	1	0.85	Nippissing	4	2	0.76
Hailburton	5	10	0.66	Parry Sound	22	16	0.53
Hastings	11	3	0.81	Durham	2	1	0.79
Huron	9	4	0.94	Haldimand-Norfolk	3	1	0.84
Kent	1	1	0.61	Hamilton-Wentworth	2	1	0.47
Lanark	24	8	0.94	Ottawa-Carleton	3	1	0.52
Leeds & Grenville	13	1	0.97	Peel	5	1	0.67
Lennox & Addington	3	0	1.12	Oxford	6	0	0.93
Middlesex	13	7	0.94	Sudbury	3	2	0.54
Perth	7	4	0.82	Waterloo	23	6	1.21
Peterborough	8	2	0.82	York	4	1	0.86
Prescott & Russell	2	2	0.85	Muskoka	11	5	0.65
Renfrew	18	5	0.71	Dufferin	4	3	1.21
Simcoe	17	6	0.66	Lambton	2	0	1.18
Northumberland	11	0	0.91	Halton	2	0	0.86

Total number of surveys returned = 308
Total number of surveys reporting decline = 96
Average productivity ratio = 0.82


NUMBER OF SURVEY RETURNS REPORTING HARDWOOD DECLINE
83°W
79°W
75°W
46°N
43°N
PARRY SOUND
NIPISSING
RENFREW
PRESCOTT
RUSSELL
OTTAWA-CARLETON
GLENGARY
STORMONT
DUNDAS
LANARK
GRENVILLE
FRONTENAC
LEEDS
LENNOX and ADDINGTON
HASTINGS
PRINCE EDWARD
HALIBURTON
MUSKOKA
Georgian Bay
PETERBOROUGH
VICTORIA
NORTHUMBERLAND
DURHAM
SIMCOE
YORK
PEEL
MT
HALTON
WENTWORTH
NIAGARA
BRANT
OXFORD
NORFOLK HALDIMAND
WELLINGTON
DUFFERIN
GREY
BRUCE
HURON
PERTH
WATERLOO
MIDDLESEX
ELGIN
LAMBTON
KENT
ESSEX
LAKE HURON
LAKE ONTARIO
LAKE ERIE
Counties with less than 5 survey returns: Dufferin, Elgin, Essex, Kent, Lambton, Lennox/Addington, Precott/Russell, Prince Edward, Nipissing, Sudbury, Durham, Haldimand/Norfolk, Halton, Hamilton/Wentworth, Ottawa/Carleton, York.
no survey returns
less than 25%
26% - 50%
greater than 50%


PRODUCTIVITY RATIO
BY COUNTY
83° W
79° W
75° W
46 N
43 N
NIPISSING
PARRY SOUND
RENFREW
Georgian
Bay
MUSKOKA
HALIBURTON
LANARK
GRENVILLE
LEEDS
FRONTENAC
PETERBOROUGH
HASTINGS
PRINCE EDWARD
NORTHUMBERLAND
DURHAM
YORK
SIMCOE
GREY
BRUCE
LAKE HURON
LAKE ONTARIO
HURON
PERTH
WELLINGTON
PEEL
HALTON
WATERLOO
MIDDLESEX
OXFORD
BRANT
WENTWORTH
NIAGARA
LAMBTON
ELGIN
NORFOLK
HALDIMAND
ESSEX
KENT
LAKE ERIE
MT
Counties with less than 5 survey returns: Dufferin, Elgin, Essex, Kent, Lambton, Lennox/ Addington, Prescott/Russell, Prince Edward, Nipissing, Sudbury, Durham, Haldimand/ Norfolk, Halton, Hamilton/ Wentworth, Ottawa/Carleton, York.
no survey returns
less than 0.50
0.51 - 0.75
0.76 -1.00
greater than 1.00
Productivity Ratio
litres syrup
taps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